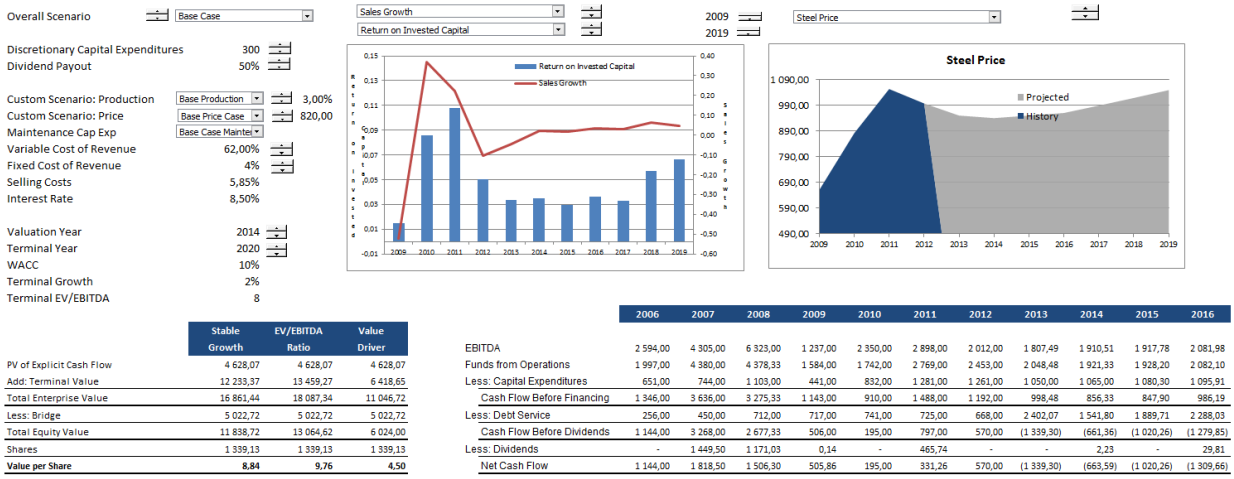
Structure of a Corporate Model to Recount the History of the Company and Make Forecasts that Include Sensible Outlooks of Key Drivers

Among other things, forecasts from corporate models are used to compute free for making valuations and to assess the credit quality of a company in the context of providing loans. Valuation from corporate models may use discounted free cash flow, evaluate earnings per share or it could be derived from equity cash flow. Loans may be assessed in a corporate model through gauging the ability to repay debt service from cash flow and/or evaluating the capability of the corporation to repay the loans through re-financing given a set of credit quality indicators such as debt to equity and debt to cash flow ratios.

The structure of a corporate model is directly associated with the idea that a company has a history and an indefinite lifetime (unlike a project finance investment that generally has no historic record and will end once the asset is no longer useful). Whereas a project finance analysis is analogous to a person's life or to a relationship -- both of which have a definite beginning and end -- a corporation is more analogous to a family, a country or city which may have seen better times or may have bright future prospects. The indefinite life of a corporation means that a financial model can only take a snap shot of the company that covers a portion of its history and also that the forecast must stop at some point while the company is still generating cash flows. It is usually impracticable to include all periods of history in the model and it would be silly to try to make a forecast that extents infinitely. But including enough history in a model so that you can make judgments about exposures to economic downturns and potential volatility in cash flow is an essential part of making a corporate model. When Winston Churchill observed: “The farther backward you can look, the farther forward you can see” he surely was not talking about the structure of a corporate financial model, but the quote is relevant to the structure of a corporate model. Perhaps the most prominent feature that differentiates corporate models from project finance models is incorporation of historic data and the ability to analyse both projected results alongside historic data.

Designing the structure of a model should follow a logical and natural progression beginning with history, moving to assumptions, computing operating cash flows and then adding debt financing. When setting up a corporate model, the structure should allow users of the model to easily make judgments with respect to whether assumptions are reasonable in the context of historical performance. As part of the historic evaluation, it is a good idea to present historic together with projected financial ratios such as return on invested capital, EBITDA margin and credit ratios in order to tell a story about what has happened to the company in the past and what you expect to happen in the future. By presenting financial ratios such as return on investment next to the key assumptions, you and others can quickly see if you made some nonsensical assumptions and your model is less of a black box. In addition to recounting a tale about what happened in the past, financial analysis of history provides a basis for comparing projections with actual results that can be used as a simple check on the reasonableness of a forecast. If the return on investment has consistently hovered between 8% and 10% and your forecast shows a return of 20% you better have a very good and simple explanation about what kind of special thing the company is going to do to earn the higher return.

To illustrate how corporate finance analysis is centred on analysis of history and should be a narrative about the company, the excerpt below from the summary page of a corporate model shows how graphs of historic data is connected to assumptions and how the valuation is most effective when it is judged in light of historic and projected financial ratios. There is one graph that shows a couple of financial ratios together (in this case it shows sales growth and return investment corresponding to the fundamental idea of corporate finance theory that when returns exceed the cost of capital, it is good for investors to grow a company). A second graph shows the history and forecast for one of the key assumptions. The drop down boxes allow you to see a wide range of assumptions in the right hand side graph while the graph in the middle of the page shows he historic and projected return on invested capital along with the sale growth. These graphs are shown together with key operating assumptions and a summary of valuation and credit quality indicators.

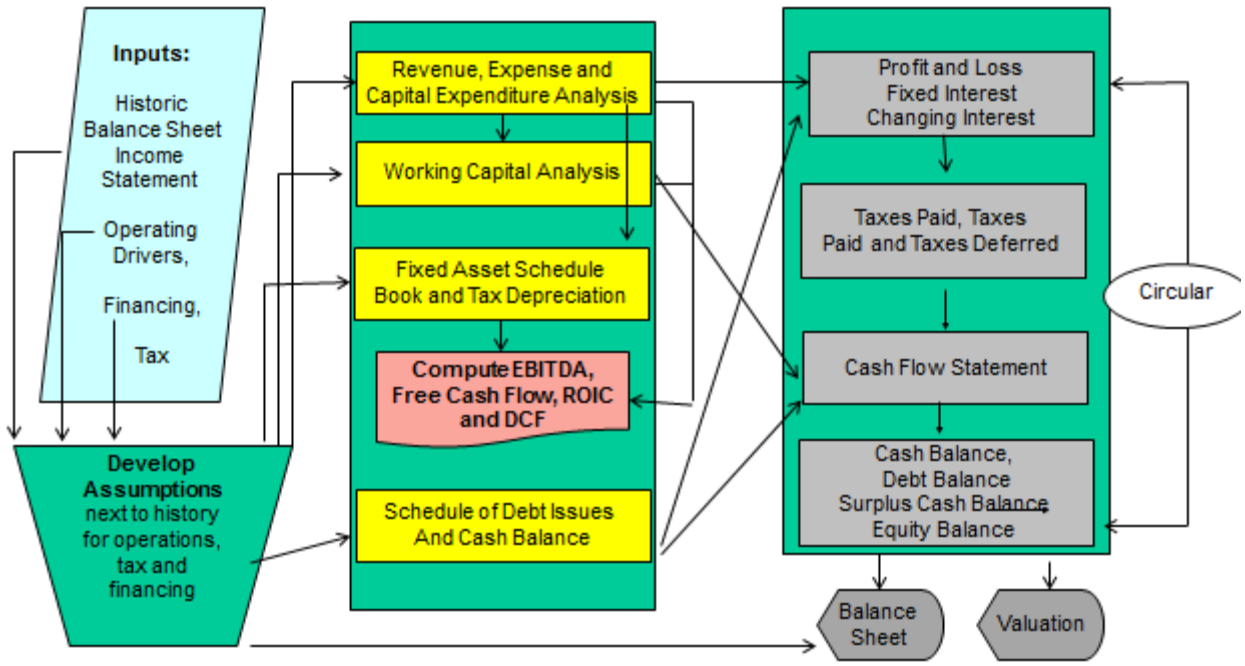


	Stable Growth	EV/EBITDA Ratio	Value Driver
PV of Explicit Cash Flow	4 628,07	4 628,07	4 628,07
Add: Terminal Value	12 233,37	13 459,27	6 418,65
Total Enterprise Value	16 861,44	18 087,34	11 046,72
Less: Bridge	5 022,72	5 022,72	5 022,72
Total Equity Value	11 838,72	13 064,62	6 024,00
Shares	1 339,13	1 339,13	1 339,13
Value per Share	**8.84**	**9.76**	**4.50**

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
EBITDA	2 594,00	4 305,00	6 323,00	1 237,00	2 350,00	2 898,00	2 012,00	1 807,49	1 910,51	1 917,78	2 081,98
Funds from Operations	1 997,00	4 380,00	4 378,33	1 584,00	1 742,00	2 769,00	2 453,00	2 048,48	1 921,33	1 928,20	2 082,10
Less: Capital Expenditures	651,00	744,00	1 103,00	441,00	832,00	1 281,00	1 261,00	1 050,00	1 065,00	1 080,30	1 095,91
Cash Flow Before Financing	1 346,00	3 636,00	3 275,33	1 143,00	910,00	1 488,00	1 192,00	998,48	856,33	847,90	986,19
Less: Debt Service	256,00	450,00	712,00	717,00	741,00	725,00	668,00	2 402,07	1 541,80	1 889,71	2 288,03
Cash Flow Before Dividends	1 144,00	3 268,00	2 677,33	506,00	195,00	797,00	570,00	(1 339,30)	(661,36)	(1 020,26)	(1 279,85)
Less: Dividends	-	1 449,50	1 171,03	0,14	-	465,74	-	-	2,23	-	29,81
Net Cash Flow	1 144,00	1 818,50	1 506,30	505,86	195,00	331,26	570,00	(1 339,30)	(663,59)	(1 020,26)	(1 309,66)

After painting a picture of the company using historic financial statement analysis, structuring a corporate model involves defining how one incorporates history as well as prospective industry structure and economic assumptions to assess the value of a business. The mechanical process uses an historic balance sheet items and connects interest expense and interest income in the income statement to the balance sheet debt through evaluating the cash flow. The process of beginning with historic balance sheets and then working through each component of the balance sheet in distinct parts of the model produces a structure which should be transparent and accurate. In a corporate model, two very simple ideas can dramatically improve the structure of the model. The first is understanding that the starting point for all of the fixed asset accounts, debt accounts, working capital accounts, deferred tax accounts, accumulated depreciation accounts, surplus cash accounts, and other items come straight from historic balance sheet. The second is setting up separate accounts for all of these items where historic closing balances come from the historic balance sheet and projected amounts are often directly or indirectly derived from capital expenditure, revenue and expense forecasts. For example, capital expenditures are added to the opening plant balance (and retirements can be deducted from the balance) to yield the closing balance for the next period.

Structure of a Standard Corporate Model



Natural progression of assumption development and working analysis from the income statement and the balance sheet. All the way from the top line revenues to minority interest, earnings per share and dividends. Most of focus should be on the top line and more mechanical as move down the income statement. Each line item should be analysed and some can be aggregated. Similar story for the balance sheet. Most items already evaluated by working through the income statement, but some such as A/R to revenue, provisions, goodwill and so forth must be reflected.

The diagram above is intended to illustrate some of the important points in structuring a corporate model. The process begins with analysis of history and the using historic balance sheets to set-up accounts. The working analysis, the fixed asset balance and the debt schedule are the essential intermediate steps that should be completed before constructing financial statements. Developing revenues, operating expenses and capital expenditures in the working sheets is just about always the most important part of the analysis. When making forecasts of revenues, expenses and capital expenditures it is generally a good idea to graph history and projections of key variables that drive these three things such as prices, market share, industry demand growth, capacity utilization, variable costs and capital expenditures per unit. Once the operating analysis, depreciation, and debt analysis are complete, financial statements can be constructed. As most of the components of financial statements such as revenues, depreciation and interest expenses have already been in separately structured sections, this part of the analysis should be quite simple.

One of the main computational challenges in a corporate model is to determine how surplus or deficit cash should be deployed and to develop projections of depreciation and deferred taxes that account for the lifetime of different asset classes. The diagram below illustrates that connection of the profit and loss statement with the interest expense and interest income that is a typical characteristic of a corporate model (that can create circularity). The arrow on the right hand side of the diagram is meant to show that interest expense on new debt calculated from the model is not known until the debt balance is computed from the cash flow and interest income on surplus cash is not known until the amount of surplus cash is derived. Unlike project finance models, dividends are determined from an algorithm such as a payout ratio and are not the result of the cash flow process.

The final parts of the diagram show that the balance sheet should be an output of the model rather than part of the mechanical calculations. To construct a projected balance sheet, the common equity balance can be calculated using historic balance sheet data and projections of net income and dividends as with the other balance sheet accounts where an opening balance and changes are included (a similar account can be computed for minority interest.) With all of the accounts completed including the equity balance, the balance sheet can be computed by simply gathering together the closing balance of all of the accounts. Then you can be so very happy to see that your balance sheet is in balance for every single period of the model. Much of the remainder of this chapter is structured to work through each part of the model shown in the diagram above: there is a separate section devoted to discussing economic, financial and modelling issues associated with the input section; the operating or working section; the debt schedule; the profit and loss statement and the cash flow statement.

Some of the computational challenges in corporate models include:

- Development of effective assumptions that include industry supply and demand and conversion of capacity, demand and market share into revenues, expenses and capital expenditures;
- Flexible incorporation of historical financial data to accept updates when new financial data become available;
- Modelling projected depreciation expense with asset retirements, deferred taxes and net operating losses;
- Including target capital structures in the models rather than assuming net cash flow builds up cash balances or accumulates debt; and,
- Dealing with unfunded pensions, derivative assets and liabilities, stock options, intangible assets and other items.

Graphing Data with the INDEX function and the Wiper Method

This book is structured by first discussing conceptual issues associated with financial and economic modelling and then presenting practical spreadsheet methods to implement the ideas. To demonstrate the manner in which analytical methods are presented, the INDEX and the MATCH functions are introduced in this section. For a corporate model, one of the most useful spreadsheet functions is the INDEX function. This function allows development of scenario analysis; it can be used to create graphs of all of the assumptions with dropdown boxes; it permits you to make flexible valuation analysis with different valuation start dates and it is useful for many other things in all types of models.

The INDEX function does nothing other than finding the value of a cell in a given area after defining a row, a column or both a row and a column (it could be called the find function, but the find function is used in working with strings). One of the most effective ways to use the INDEX function is to select an entire sheet and then provide the row and column number to find a value in the sheet or to select an entire column (row) of data and provide the row (column) number to find a value as shown below:

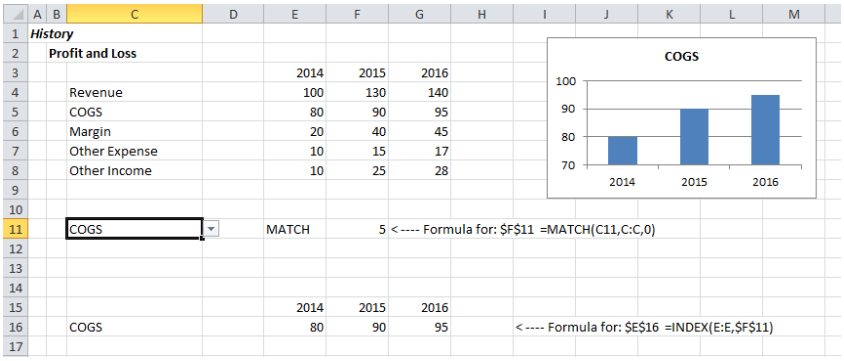
Value = INDEX(Defined Area, Input Row of Area, Input Column of Area)
Value = INDEX(Entire Sheet -- on upper left, Input Row of Sheet, Input Column of Sheet)
Value = INDEX(Defined Column, Row of Column Area)
Value = INDEX(Entire Column of Sheet -- click on entire column, Row in Sheet)
Value = INDEX(Defined Row, Column of Row Area)
Value = INDEX(Entire Row of Sheet, Column in Sheet)

The way different ratios, assumptions or historic items can be selected for making a graph in a corporate model is to find the row or the column for the item using the MATCH function. Say the word REVENUE is in the fourth row of the sheet as shown in the example below. The MATCH function can give you the number 4 if you enter the formula below:

Row of Sheet = MATCH("REVENUE", Entire Row of Titles, 0)

The MATCH function can also be used to give you the column number and it is not necessary to use the MATCH function with an entire row or an entire column. The zero in the above formula is used as an option that specifies the exact value must be found (this is discussed in more detail below).

Once the Row is defined from the MATCH function, the INDEX function can be used with alternative columns to collect and the fixed row number (using the F4 short-cut key to fix the row number in different columns). In presenting analysis techniques in this book, an excerpt from a spreadsheet is often presented to illustrate how the process works. The excerpt below shows how the MATCH and INDEX functions can be used with the data validation feature in excel to pick alternative variables in a sheet. After the INDEX is defined a graph is created with the ALT and F1 short-cut key. The example demonstrates that the MATCH and the INDEX are brother functions. As you become a spreadsheet wizard, you should show your prowess by stating how you use the MATCH and INDEX functions to differentiate you from an unsophisticated users.



Making the Painful Process of Acquiring Data from a PDF File Easier

When making forecasts in the 1980's you had to ring the company and ask for the annual reports to be sent after which you had to manually type in all of the data. Life is better now but certainly not perfect. You can directly download data from free websites or you can pay a lot of money to Bloomberg for the data but invariably you still need to use some data from the annual report of a company that is not in a nicely structured spreadsheet but instead part of a pdf file. Copying data from a pdf file into excel results in a mess where words are in different cells and numbers are not in consistent columns (sometimes the items are not in different cells which means you should use the text to columns option in the data menu). The data may look something like the format below:

Notes	2008	2007	2006										
ASSETS													
Non-curre	assets												
Property,	plant	and	equipmer	9,00	$	9,01	$	10,11	$	3,66			
Intangible	assets	other	than	goodwill	10,00	885,00	806,00	37,00					
Goodwill	5,00	2,39	2,15	112,00									
Investmer	in	joint	ventures	and	associates	11,00	551,00	592,00	1,49				
Deferred	income	tax	assets	8,00	44,00	22,00	11,00						
Other	non-curre	assets	13,00	278,00	240,00	272,00							
13,16	13,91	5,58											
Current	assets												
Inventorie	14,00	2,42	1,62	864,00									
Trade	and	other	receivable	15,00	1,37	1,80	556,00						
Prepayme	76,00	196,00	82,00										
Loans	receivable	108,00	48,00	19,00									
Receivabl	from	related	parties	16,00	137,00	60,00	54,00						
Income	tax	receivable	262,00	86,00	51,00								
Other	taxes	recoverab	17,00	397,00	351,00	331,00							
Short-terr	investmer	18,00	589,00	25,00	25,00								
Cash	and	cash	equivalen	19,00	930,00	327,00	842,00						
6,28	4,51	2,82											
Assets	of	disposal	groups	classifi	ed	as	held	for	sale	12,00	7,00	211,00	105,00
6,29	4,73	2,93											
Total	assets	$	19,45	$	18,64	$	8,51						

To format the data you can create a macro to move numbers into a consistent column and then use a function to sum the text into a single cell. Once you run the function and the macro the format is cleaned up as shown below:

	2008	2007	2006
ASSETS			
Non-current assets			
Property, plant and equipment 9	9,012	10,107	3,655
Intangible assets other than goodwill 10	885	806	37
Goodwill 5	2,387	2,145	112
Investments in joint ventures and associates 11	551	592	1,494
Deferred income tax assets 8	44	22	11
Other non-current assets 13	278	240	272
	13,157	13,912	5,581
Current assets			
Inventories 14	2,416	1,619	864
Trade and other receivables 15	1,369	1,802	556
Prepayments	76	196	82
Loans receivable	108	48	19
Receivables from related parties 16	137	60	54
Income tax receivable	262	86	51
Other taxes recoverable 17	397	351	331
Short-term investments 18	589	25	25
Cash and cash equivalents 19	930	327	842
	6,284	4,514	2,824
Assets of disposal groups classifi ed as held for sale 12	7	211	105
	6,291	4,725	2,929
Total assets	19,448	18,637	8,51

Writing the macro and the function only require a few lines of code using two fundamental concepts. The first is a FOR and NEXT loop and the second is the CELLS command. In the next few chapters these concepts are described in detail and an explanation of the code is included appendix to this chapter.